CHARACTERISTICS AND UTILIZATION PATTERNS OF NEEDLE-EXCHANGE ATTENDEES IN CHICAGO: 1994–1998

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ABSTRACT The objectives of this study were to describe characteristics and utilization patterns of participants attending a needle-exchange program (NEP) in Chicago, Illinois. Since 1994, demographics of NEP attendees and program utilization data were collected systematically at 22 sites operated by the Chicago Recovery Alliance (CRA). Descriptive statistics were used to assess time trends, site variations, and characteristics of attendees in day sites versus evening sites. A total of 11,855 injection drug users (IDUs) visited the NEP at least once from 1994 to 1998. Median age was 41 years, and 74% were male. Overall race distribution was African-American 50%, Caucasian 38%, Puerto Rican 10%, other 2%. Over time, there was a proportional decrease in African-American users (55.4% to 39.9%, $P < .001$), a significant increase in Puerto Rican users (1.4% to 14.1%, $P < .001$), and a stable proportion of Caucasian users (42%). Each year, 15–20% of all clients were first-time attenders. Overall, participants attending evening versus day sites were younger (median age 39 years vs. 42 years, $P < .001$) and more ethnically diverse. Over a 4-year period, this NEP reached a diverse population of IDUs and recruited a stable proportion of first-time users. Compared to daytime NEP venues, evening NEP sites attracted younger clients and those who were more diverse ethnically. To maximize coverage of sterile syringes, NEPs should strive for diversification in terms of hours of operation and location.

KEY WORDS Harm Reduction, HIV/AIDS, Injection Drug Use, Needle-Exchange Programs, Youth.

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INTRODUCTION

Sharing of contaminated injecting equipment is a major transmission route for infectious diseases, including the human immunodeficiency virus (HIV) and hepatitis B and C viruses (HBV and HCV, respectively).[1-4] Despite declines in acquired immunodeficiency syndrome (AIDS) incidence and mortality in the US, HIV incidence has continued to rise among certain populations, such as injecting drug users (IDUs). Taking into account direct transmission due to needle sharing and indirect transmission due to heterosexual and perinatal transmission, IDUs currently account for approximately half of all new HIV infections occurring on an annual basis in the US.[5]

The last few years have shown considerable success of harm reduction programs that attempt to reduce the negative medical consequences associated with injection drug use. Three proven interventions among IDUs are those that involve outreach, expanded syringe access, and drug treatment.[4,6-10] In particular, needle-exchange programs (NEPs) have been associated with declines in incidence and prevalence of HIV, HBV, and HCV.[7,8,11-13] as well as decreased needle sharing among HIV-negative and HIV-positive IDUs.[14-18] To reduce the risk of blood-borne diseases, NEPs provide IDUs with clean syringes and needles in exchange for potentially contaminated ones and often offer referrals to drug treatment, sexually transmitted disease clinics, and medical facilities.[19-22]

To be effective, NEPs must provide enough sterile syringes to meet the needs of the IDU communities they serve, ideally, a sterile syringe for every new injection.[23] However, due to an ongoing congressional ban preventing federal support of NEPs in the US, only 10% of NEPs report exchanging more than 1 million syringes per year,[19] compared to 1.5 billion injections that are estimated to occur annually.[24] With some NEPs reporting attrition rates as high as 50%, and less than 10% of new participants attending more than 20 times,[1,25-27] there is a need to examine factors that maximize continuity and coverage of NEPs.[1,17,27] To date, there has been limited data on components of NEPs that encourage client participation.

The Chicago Recovery Alliance (CRA) is one of the largest NEPs in the US.[19] The CRA serves as a unique example of a program that offers harm reduction services to a large and diverse clientele through multiple sites, different NEP venues (i.e., van, storefront, beeper/pager service), and flexibility in terms of hours of operation (day and evening). The purpose of this study was to describe characteristics of NEP participants attending CRA sites over a 4-year period. The findings reported here provide a means by which program planners, policy makers, and frontline NEP staff can hope to optimize NEP coverage. Efforts to

evaluate NEPs in the US will also benefit from studies that describe patterns of NEP utilization across different program types.

METHODS

Description of the Chicago Recovery Alliance

The CRA is one of two NEPs operating in Chicago. The CRA began offering NEP services in 1992, with 4 sites opening in 1992 and 3–6 new sites introduced per year. As of December 1998, 22 CRA sites were operating, the majority of which (16 sites, 72.7%) consisted of services offered through a mobile delivery-like vehicle, 2 were storefront locations (9.1%), and 4 sites (18.2%) were operated solely by the use of a pager/cell phone system. The pager/cell phone NEP service was available at specific times during the day or evening. This service provided individualized syringe exchange to persons who could not access any of the other sites (e.g., due to transportation problems). Clients could learn about NEP locations and availability of the pager and cell phone system through a variety of means, including an Internet Web site for CRA (www.anypositivechange.org), postcards distributed at NEP sites, and word of mouth.

Of the 22 sites, 9 (41%) were open exclusively during the daytime (i.e., 8 A.M. to 4 P.M.), 10 (45.5%) were open only during the evening (i.e., 5 P.M. to 9 P.M.), and 3 sites (13.6%) were open during both daytime and evening hours. Apart from the provision of syringe materials (bleach, cotton, cookers, alcohol swabs), a variety of other harm reduction services were available, including barrier contraception (i.e., dental dams, male and female condoms); free hepatitis A, B, and C testing and vaccinations for hepatitis A and B; free HIV testing and counseling; and referrals to drug treatment services.

Data Collection

Since 1994, each NEP registrant was required to complete a short questionnaire administered by CRA staff; the participant's demographic information (age, sex, gender, race) and location of residence (ZIP code) were collected. To preserve anonymity while permitting service utilization data to be collected, each participant received a unique code on a registration card. The code was created by using the participant's gender, first letter of first name, date of birth, and mother's first name. At each subsequent visit, the number of syringes exchanged was recorded, together with data on the location and time of the exchange. At each visit, the exchange of syringes was based on approximately 5 more syringes provided in return for the total number of used syringes brought to the needle exchange.

Figure 1 is a depiction of the 22 NEP sites; 19 are spread over regions in Chicago city, and 3 are located in the suburbs. Each region had approximately 2 to 4 NEP sites. The Web site included NEP site locations and times available and numbers for the pager/cell phone service for access when the NEP vans or storefront sites were not open (i.e., evening hours).

Statistical Analysis

Statistical analysis focused on overall demographic characteristics for NEP clients during the study period (January 1, 1994 to December 31, 1998), time trends, site variations, and characteristics of attendees at day versus evening sites. Proportions of new users per year were calculated, including the median number and interquartile range (IQR) for syringes exchanged per year and by site. Comparisons between subgroups (e.g., by region or day versus evening venues) were conducted using chi-square tests for trend. Due to the potential for time trend data to be biased by the introduction of new NEP sites, analyses were repeated by restricting them to sites that opened during the same calendar period (i.e., within the same year).

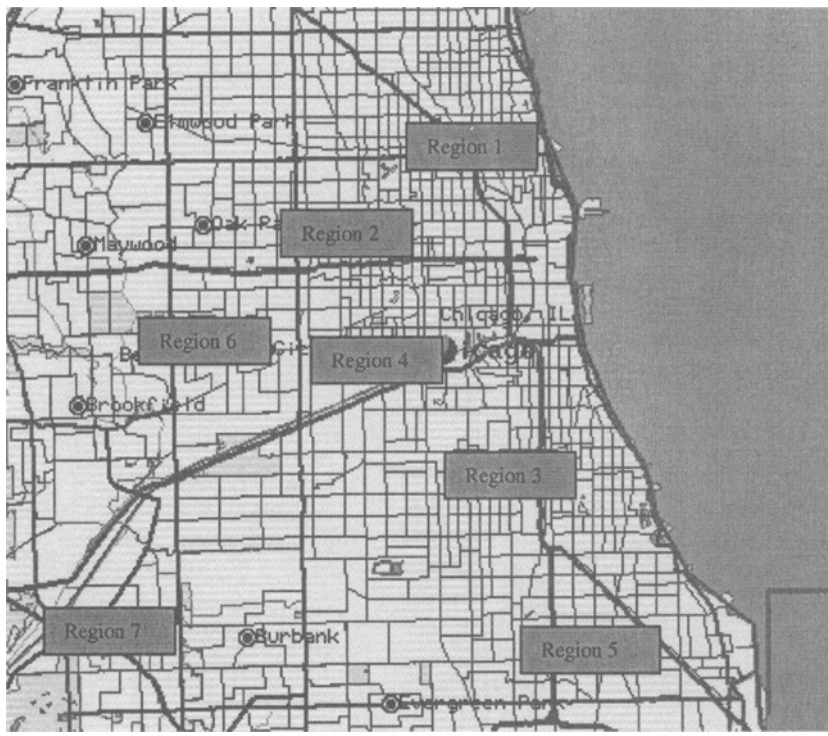

FIGURE 1 Location of NEP sites by region in Chicago.

RESULTS

A total of 11,855 IDUs visited CRA at least once from 1994 to 1998, during which time over 5 million syringes were exchanged, with approximately 1 million syringes exchanged annually. Temporal trends in the demographic characteristics of the NEP attendees are shown in Table I. Overall, the median age was 41 years; 73.5% of the NEP participants were male. The race distribution was as follows: 50.0% were African-American, 37.6% were Caucasian, 10.3% were Puerto Rican, and 2.2% were "other" (other Latin American or Native American).

During the study period, there was a proportional decrease in African-American users (55.4% to 39.9%, $P < .001$) and an increase in Puerto Rican users (1.4% to 14.1%, $P < .001$); the proportion of Caucasian users remained stable at approximately 42%. Over time, the proportion of younger users (<30 years) increased significantly, from 11.0% to 17.2% ($P < .001$). The proportion of women increased marginally over the study period, from 23.7% to 28.3% ($P = .54$).

Over time, the median number of syringes exchanged per visit increased from 44 (IQR 23–75) to 49 (IQR 27–48) across all sites ($P < .001$). There was a slightly higher median number of syringes exchanged per visit by women (48; IQR 25–84) compared to men (44; IQR 23–77) ($P < .001$). The proportion of new users stabilized over time, with about 15–20% of the total users being new attendees each year. After repeating this analysis but restricting data to NEP sites that were introduced in the same year, results did not differ appreciably from those presented in Table I.

Based on the distributions of NEP sites by region in Chicago (Fig. 1), Figs. 2

TABLE I Demographic Distribution of Participants of Chicago Needle Exchange Over Time

	Overall (N = 11,855) n (%)	1994 (N = 1,538) n (%)	1995 (N = 3,323) n (%)	1996 (N = 2,554) n (%)	1997 (N = 2,574) n (%)	1998 (N = 1,864) n (%)
Male	8,717 (73.53)	1,174 (76.33)	2,496 (75.11)	1,853 (72.55)	1,857 (72.14)	1,336 (71.67)
Female	3,138 (26.47)	364 (23.67)	827 (24.89)	701 (27.45)	717 (27.86)	528 (28.33)
Median age (interquartile range)	41 (36–47)	40 (36–46)	42 (36–47)	41 (36–46)	41 (36–47)	41 (34–47)
<30 years	1,560 (13.16)	169 (11.0)	356 (10.71)	323 (12.65)	390 (15.15)	321 (17.22)
31–40 years	3,948 (33.30)	604 (39.27)	1,139 (34.28)	848 (33.20)	792 (30.77)	564 (30.26)
41–50 years	48.58 (40.98)	568 (37.93)	1,393 (41.92)	1,067 (41.78)	1,081 (42.0)	749 (40.18)
50+ years	1,489 (12.56)	197 (12.81)	435 (13.09)	316 (12.37)	311 (12.08)	230 (12.34)
African-American	5,664 (49.96)	710 (55.43)	1,741 (56.29)	1,285 (50.91)	1,185 (46.04)	743 (39.88)
Caucasian	4,264 (37.61)	540 (42.15)	1,090 (35.24)	860 (34.07)	969 (37.65)	803 (43.10)
Puerto Rican	1,163 (10.26)	18 (1.41)	218 (7.05)	330 (13.07)	335 (13.01)	262 (14.06)
Other	246 (2.17)	13 (1.01)	44 (1.42)	49 (1.94)	85 (3.30)	55 (2.95)

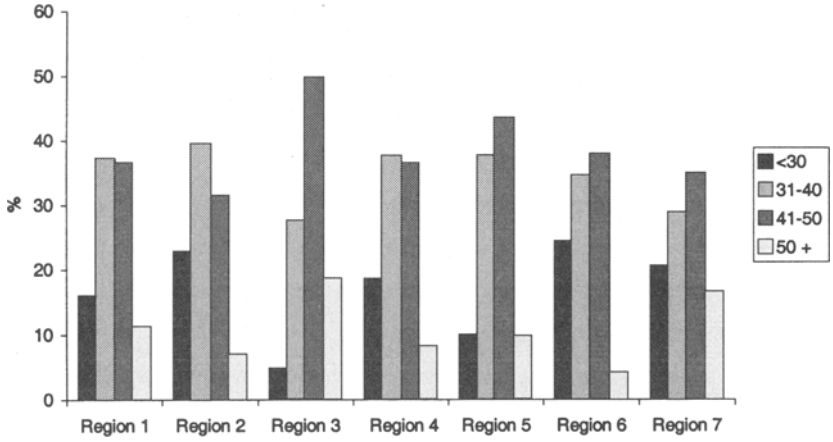

FIGURE 2 Age distribution of participants attending NEPs in different regions of Chicago.

and 3 show the age and race distribution, respectively, of NEP participants by region. There was considerable variability in terms of characteristics of NEP attendees by geographic location, with Regions 2, 6, and 7 attracting a large proportion of younger IDUs (i.e., <30 years) and Caucasian and Puerto Rican users, while Regions 3 and 5 attracted a higher proportion of older clients (i.e., >30 years), who tended to be African-American. The sex distribution across regions revealed that Regions 4 to 7 attracted a larger proportion of women (approximately 38%) (relative to regions 1–3, which attracted approximately 25% women). Interestingly, in Region 7, almost 50% of NEP users were women.

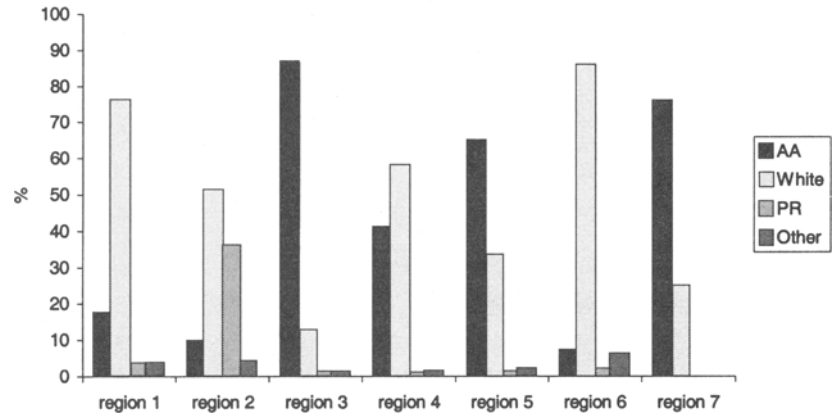

FIGURE 3 Race distribution of participants attending NEPs in different regions of Chicago (AA = African-American; PR = Puerto Rican).

The demographic distribution of NEP participants by hour of operation is shown in Table II. Of the 9 sites open only in the daytime (N = 8,484), clients were predominantly African-American (60.9%), and the proportion of clients aged 30 years or less was 9.8%. In contrast, among the 10 sites open only in the evenings (N = 3,233), clients were predominantly Caucasian (46.2%) and Puerto Rican (32.2%), and the proportion of young users was 21.9%. Of the 3 sites that were open both days and evenings, all of which were accessible via pager or cell phone, clients were predominantly Caucasian (51.1%) or African-American (40.4%), but these data were based on much smaller numbers (N = 47). A slightly higher proportion of women attended NEP sites that were open both days and evenings compared to sites that were open exclusively during the day or the evening (29.8% vs. 26.5%, $P = .61$). There were no differences in terms of the median number of syringes exchanged per visit in day versus evening sites (47 vs. 43 syringes per visit, respectively, $P = .14$).

To illustrate better the overall associations according to time of NEP operation, descriptive data are presented from Region 2, where both day and evening NEP services were provided during the study period. Region 2 had one day and three evening sites. Compared to the daytime site, the evening sites were accessed by a higher proportion of clients who were aged 30 years or younger (22% vs. 9.8%, respectively) ($P < .001$). The ethnic composition of white, Puerto Rican, and

TABLE II Characteristics of Needle-Exchange Program Participants by Time of Operation of Needle-Exchange Program

	Day (N = 8,484) n (%)	Evening (N = 3,233) n (%)	Day & Evening (N = 47) n (%)	*P*
Male	6,219 (73.3)	2,392 (74)	33 (70.2)	.45
Female	2,265 (26.7)	841 (26)	14 (29.8)	
Median age (interquartile range)	42 (37–47)	39 (32–44)	37 (25–50)	
Age categories (years)				<.001
<30	831 (9.79)	710 (21.96)	14 (29.8)	
31–40	2,693 (31.74)	1,225 (37.89)	13 (27.7)	
41–50	3,729 (43.95)	1,069 (33.07)	13 (27.7)	
50+	1,231 (14.51)	229 (7.08)	4 (14.9)	
Race n(%)				<.001
African-American	5,041 (60.86)	520 (17.83)	19 (40.4%)	
Caucasian	2,891 (34.90)	1,348 (46.23)	24 (51.1%)	
Puerto Rican	220 (2.66)	939 (32.20)		
Other	131 (1.58)	109 (3.74)	4 (8.5%)	

African-American clients differed significantly across these three evening sites ($P < .001$). Compared to the day site, the ethnic composition of the three evening sites varied significantly; the values for day versus night were 9.8% versus 9.1% African-American, 72.4% versus 40.4% Caucasian, and 14.3% versus 46.6% Puerto Rican ($P < .001$).

DISCUSSION

The major findings of this study were two-fold; first, the provision of multiple NEP sites across different regions in Chicago attracted a diverse population of IDUs. Second, compared to daytime NEP services, evening sites attracted a higher proportion of younger, more ethnically diverse clients. Over the 4-year period of observation, there was a significant increase in the proportion of clients who were aged 30 or younger, as well as an increase in Puerto Rican IDUs, while the proportion of African-American IDUs decreased. One reason for the decrease in African-American IDUs over time may be that they used the program more rapidly early in the history of the program and may have switched to a secondary exchange source over time. Over time, the proportion of new IDUs recruited each year was relatively stable, at 15–20%, and there was an increase in the number of syringes exchanged per visit. These findings suggest that this program continued to expand coverage of sterile injection equipment to increasingly broader segments of the active IDU population in Chicago, of which some are known to be more "hidden" and harder to reach.

The finding that the program was increasingly successful in reaching younger IDUs is important. Young IDUs are more likely to be new initiates to injection and are at higher risk[28,29] of acquiring blood-borne infectious diseases such as HIV, HBV, and HCV.[28–32] Although some studies found no difference in NEP use by age,[33,34] other studies have shown that a lower proportion of young IDUs attended NEPs compared to older IDUs.[1,28,35] In Baltimore, Maryland, only 15% of IDUs aged 15 to 30 years had ever used the Baltimore NEP (C. Fuller et al., unpublished data). We hypothesize that younger IDUs may feel less visible at night and may avoid NEPs during the day for fear of police. Our data suggest that, to reach younger IDUs, NEPs should consider evening hours of operation.

We also found that IDUs attending evening sites were more diverse ethnically relative to those who visited NEP sites during the day. In particular, evening NEP venues were accessed by a higher proportion of Caucasian and Puerto Rican IDUs, whereas daytime sites predominantly attracted African-American users. Being one of the few hypersegregated cities in the US, Chicago has an interesting racial composition. To some extent, the ethnic variations we observed across

NEP sites may reflect racial variation in specific communities; however, it is also possible that some minority IDUs may feel safer crossing "ethnic boundaries" at night.

During the study period, we observed a proportional decrease in African-American users and an increase in the proportion of Puerto Rican users. These trends could be due to an increase in the number of NEP sites that were introduced in areas where these ethnic groups predominate; however, restricting our analysis to sites that were introduced during the same year yielded similar results. Alternatively, these trends could reflect changes in the Chicago IDU population over the study period. Since three-quarters of all reported IDU-related AIDS cases in the US have occurred among African-Americans and Hispanics,[36] studies of NEP utilization patterns in these populations will help ensure that prevention programs are appropriate culturally and meet the specific needs of minority populations.

Over time, the proportion of female IDUs attending NEP increased only slightly. These data are encouraging, but are consistent with other studies that show that female IDUs are likely to be under-represented among NEP attenders.[17,37,38] Among women attending a syringe-exchange program in New York, Paone et al.[19] found that Latina and Caucasian women were more isolated socially than African-American women, and Latina and Caucasian women were more likely to report high-risk behaviors. These data indicate that efforts still are needed to engage women in NEPs and ancillary support services that can help reduce their risk of infection.

Studies have shown that careful planning is required if NEPs are to attract a broad spectrum of IDUs.[22,40] Our data are consistent with the notion that to reach a sizable proportion of the IDU population in a given community effectively, NEPs should offer accessible facilities, convenient hours of operation (including evening hours), and both mobile and fixed-site locations.[41] In their study of obstacles to needle-exchange participation in Rhode Island, Rich et al.[33] found the major obstacles to be lack of awareness of the programs, inconvenient location or hours, and fear of identification and/or police harassment.[37,39,42] Bluthenthal et al.[43] studied the impact of law enforcement on syringe-exchange programs and found that syringe-exchange attendance was lower in areas where the threat of police arrests were the highest. Rockwell et al.[25] reported that use of syringe exchange was considerably higher among IDUs in New York City who lived near an NEP, and those who lived closer were less likely to engage in high-risk behavior. A comparison of IDUs who attended van-based NEP venues compared to pharmacy-based NEP services in Baltimore found that the former group was

more likely to have engaged in high-risk behaviors.[38] These data suggest that the availability of both mobile and fixed-site NEP services in Chicago is likely to have a favorable impact in reducing the spread of blood-borne infections.

Over the 4-year period of observation, we found that the program continued to recruit a stable number of new users. Anecdotal reports suggest that this could be due in part to innovative means of informing potential clients about the program, for example, using the World Wide Web. The availability of daytime and evening NEP service, including a pager/cell phone service at three NEP sites, also may have succeeded in attracting new clients.

Like other studies,[1,25,44] we found that a considerable proportion of IDUs visited the CRA only once. In most states, NEPs are illegal due to state drug paraphernalia laws that prohibit possession of hypodermic needles.[45] Studies have shown that prohibition and regulation of NEPs under legal exemptions have undermined NEP efficacy substantially.[19,46,47] In some cities, such as Chicago, IDUs who can demonstrate to police that they are registered at an NEP (i.e., through a registration card) are exempt from the law against hypodermic possession. For cities in which the laws permit possession of hypodermic needles distributed by NEPs, registering with an NEP is vitally important to avoid arrest. We hypothesize that some IDUs who have alternative sources of syringes may attend the NEP only once, for the sole purpose of receiving the registration card. An alternative explanation for discontinuing NEP use in spite of attempts to offer NEP services through a variety of locations and times is that the lack of 24-hour service may continue to be a barrier to utilization for some IDUs. However, due to the continued congressional ban on the use of federal funds to support NEPs, most cities are limited severely in terms of their ability to provide extended-hour services and multiple locations. Overall, given financial and political limitations, integrating syringe access schemes into pharmacies, drug stores, health departments, and vending machines[48] may be the only way to address this issue adequately. At the very minimum, this would require legal purchase and possession of syringes within each state.

The study has several limitations. The NEP sites studied here were introduced at different periods in time from 1992 to 1998. We attempted to avoid confounding by restricting to periods when the same sites were in operation, and we found trends to be similar. Since our analysis relied on NEP identifiers rather than survey data, some associations may have been masked since some NEP clients undoubtedly obtained program equipment for persons other than themselves, while others may have borrowed an NEP registration card belonging to someone else. Due to the lack of behavioral data and HIV test results, we were unable to

draw causal inferences based on specific types of NEP services. Nevertheless, Wiebel et al.[44] found that HIV incidence decreased from 8.4 to 2.4 per 100 person-years among out-of-treatment IDUs in Chicago between 1988 and 1992, as did the prevalence of needle-sharing behaviors. It is possible that the availability of a peer-oriented outreach program prior to the introduction of the NEP in Chicago may have "primed" the IDU population to adopt safer syringe hygiene and may have referred IDUs to NEP services.

Since NEPs differ with respect to structural and operational characteristics, evaluation of specific components of NEPs in different geographical settings is needed to enhance our ability to optimize harm reduction services. Our data suggest that diversification of NEP services increases sterile syringe coverage for subgroups of IDUs who are hard to reach, such as younger IDUs, ethnic minorities, and women.

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